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<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/774,690	TANAKA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Leith A. Al-Nazer	2821	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed on 23 December 2005.
2. ☒ The allowed claim(s) is/are 1-7 and 9-38.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.


**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

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| <ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br/>Paper No./Mail Date _____</li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)</li> <li>6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date <u>1/10/06</u></li> <li>7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other _____</li> </ol> |
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**WILSON LEE**  
**PRIMARY EXAMINER**

## DETAILED ACTION

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David J. McCrosky on 10 January 2006.

2. Amend claims 34-38 as follows:

34. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of target air in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle  $\theta$  not less than 30 degrees and not more than 90 degrees and a ratio L/G between a needle-shaped

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effective L of said first electrode and an electrode gap G is not less than 0.2 and not more than 1.5, and

an odor component or a toxic component included in said target air is treated by allowing said target air to pass a discharge field of streamer discharge caused between said first and second electrodes.

35. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a target gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle  $\theta$  not less than 30 degrees and not more than 90 degrees and a ratio L/G between a needle-shaped effective length L of said first electrode and an electrode gap G is not less than 0.2 and not more than 1.5, and

a nitrogen oxide included in said target gas is treated by allowing said target gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

36. Purification equipment comprising:

a casing; and

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a plasma reactor contained in a passage space of a flue gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle  $\theta$  not less than 30 degrees and not more than 90 degrees and a ratio  $L/G$  between a needle-shaped effective length  $L$  of said first electrode and an electrode gap  $G$  is not less than 0.2 and not more than 1.5, and

a nitrogen oxide, unburnt fuel and hydrocarbon included in said flue gas are treated by allowing said flue gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

37. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a flue gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle  $\theta$  not less than 30

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degrees and not more than 90 degrees and a ratio L/G between a needle-shaped effective length L of said first electrode and an electrode gap G is not less than 0.2 and not more than 1.5, and

dioxin included in said flue gas is treated by allowing said flue gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

38. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a flon gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle  $\theta$  not less than 30 degrees and not more than 90 degrees and a ratio L/G between a needle-shaped effective length L of said first electrode and an electrode gap G is not less than 0.2 and not more than 1.5, and

said flon gas is treated by allowing said flon gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

***Allowable Subject Matter***

3. Claims 1-7 and 9-38 are allowed.

4. The following is an examiner's statement of reasons for allowance:

The prior art of record fails to teach or suggest one or more of the limitations found in independent claims 1 and 34-38. Japanese Patent Document No. 08-155249 to Tetsuya et al. teaches a prior art gas purification apparatus. With respect to independent claims 1 and 34-38, Tetsuya, as well as the other prior art of record, fails to teach or suggest a plasma reactor comprising the combination of a first electrode in the shape of a needle; a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to the first electrode; and the first electrode having a pointed portion as an end thereof on the side of the second electrode and the pointed portion having a point angle  $\theta$  not less than 30 degrees and not more than 90 degrees and a ratio  $L/G$  between a needle-shaped effective length  $L$  of the first electrode and an electrode gap  $G$  being not less than 0.2 and not more than 1.5. Therefore, independent claims 1 and 34-38, as well as all respective dependent claims, are allowable over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Communication Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leith A. Al-Nazer whose telephone number is 571-272-1938. The examiner can normally be reached on Monday-Friday, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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WILSON LEE  
PRIMARY EXAMINER